

A checklist of bryophytes of the wallum habitat of south-eastern Queensland and north-eastern New South Wales

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Summary

Windolf, J (1999). A checklist of bryophytes of the wallum habitat of south-eastern Queensland and north-eastern New South Wales (*Austrobaileya* 5(2) 349-352). A descriptive analysis of the bryophytes occurring within the wallum environment, together with notes on their host/substratum, micro-habitat and occurrence in the adjacent bryophyte community is provided. Six moss and five liverwort species are recorded, and the most northerly known occurrence of the moss *Sphagnum australe* Mitt. is noted.

Keywords: Bryophytes, Wallum

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Introduction

The study reported on here was undertaken to provide information on the bryophyte species present in the wallum habitat of south-eastern Queensland and north-eastern New South Wales. Any previous studies in this specialist area have apparently not been reported in the literature, so it was considered to be a matter of some urgency, given the rapidly diminishing state of this unique habitat, that one be undertaken. Because of its pleasant climate and its proximity to large centres of population, the area encompassing the wallum is in increasing demand both as a tourist and recreational destination, and as a source of agricultural land, primarily for the cultivation of sugar cane. The physical inroads of urban development as well as of primary production, and their associated infrastructures such as roads and drainage, have contributed to severe modifications to the landform of the wallum via reduction of intact volume, altered watertables, the introduction of foreign species and the unnatural frequency of fire (Harold 1987, Windolf 1987a). Even those areas which have until now escaped actual destruction of their original habitats probably have a limited time in their native state.

What is wallum?

The wallum habitat is widely accepted as a narrow area of nutrient deficient wet heathland occurring immediately inland of the coastal

sand-dunes in south-eastern Queensland and north-eastern New South Wales, from Bundaberg in the north to Ballina in the south, although limited outliers occur as far north as Shoalwater Bay and southward to Port Stevens. It is characterised by shallow, sandy, acid (pH 3.5–4.0) soils, particularly deficient in nitrogen, phosphorous and trace elements, which, however, support a highly diversified heathland type vegetation. These soils overlie an impermeable organic sandstone which restricts drainage. This results in the watertable, except in extreme droughts, remaining relatively high. Variations in altitude are generally less than a metre, but even these create significant zonation patterns ranging from the deepest sections, which are either slow-moving drainage channels or shallow, closed lagoons, to relatively dry, open heathland. The surfaces of the depressions, which are usually covered by standing water, or at least remain moist throughout the year, are occupied by the reed-like sedges, *Baumea rubiginosa* and *Lepironia articulata*. The margins of these areas are often occupied by dense thickets of stunted (1–2 m in height) *Melaleuca quinquinervia*, a species which also occupies the occasional deeper stream, but which then tends to adopt a more normal growth pattern and form narrow belts of closed forest up to 10 m high. On the sloping sides of these depressions, there is a graduated floristic change as the elevation increases, passing through belts of *Leptospermum*, *Empodisma*, *Pultenaea*, *Xanthorrhoea* and

Boronia species to the highest level where the substratum is only seasonally waterlogged and the vegetation is more characteristic of open heathland. There it generally includes the species *Banksia aemula*, or “wallum” to the Aborigines, from which the habitat derives its name (Campbell, Sharpe & Windolf 1995, Windolf 1987a). This heathland then gradually changes into sclerophyll forest and shrubland which inhabits the adjoining sandy ridges.

Climate

The climate of the wallum is of the subtropical humid, east-coast type characterised by hot summers, mild winters and a clearly defined wet season. Annual rainfall varies from 1400 mm to 2000 mm, approximately half of which falls, on average, between the beginning of January and the end of April, but this is prone to wide variation, both in timing and magnitude. A limited number of frosts usually occur during June, July and August (Windolf 1987a).

Methodology

The research was conducted over a period of approximately five years and comprised the collecting of specimens and the recording of species, as well as the taking of notes on host/substratum relationships and habitats at various sites. Similar investigations were also carried out at the same time in adjacent areas with a view to determining whether the wallum bryophyte community was in any way unique, or exists merely as an extension of bryophyte communities in adjoining areas.

Collecting was principally carried out in the Wide Bay and Sunshine Coast regions in Queensland and around Ballina and Evans Head in New South Wales. Detailed studies were conducted in the Noosa, Peregian, Coolool region with general collecting being carried out in other areas.

Species list

The following species of bryophytes have been recorded for the wallum habitats of eastern Australia. Voucher specimens are housed in the Queensland Herbarium (BRI), the herbarium of the Hattori Botanical Laboratory (NICH),

and the author's private collection. The nomenclature and classification systems used are those published in *The Mosses of southern Australia* (Scott, Stone & Rosser 1976) for mosses, and *Australian Liverworts (Hepaticae): Annotated list of binominals and checklist of published species with bibliography* (Scott & Bradshaw 1986) for liverworts.

Mosses

Sphagnaceae

Sphagnum australe Mitt.

This species occurs along the margins of the wallum depressions, generally mixed with plants of *Lepironia articulata* which provide it with a protected and partially shaded micro-habitat. It is also recorded along the banks of water courses and man-made drains immediately adjacent to wallum areas. As it appears to have been spread to these sites by human intervention, it is assumed that the wallum is its original habitat in this region. It is unknown in Queensland outside of the wallum and immediately adjacent areas, although it may be more widespread than this limited recording suggests.

Ditrichaceae

Ditrichum difficile (Dub.) Fleisch.

This species is found occasionally on bare earth in the higher, drier areas of the wallum, particularly on soil which has been compressed, such as along vehicle tracks. This indicates introduction by humans, so this species should probably be seen as a randomly introduced species in the wallum. It is common in a variety of habitats throughout eastern Australia.

Dicranaceae

Leucobryum candidum (P.Beauv.) Wils.

This species occurs on dead, decaying timber and occasionally on bare soil in the drier areas. It is common in a variety of habitats throughout eastern Australia.

Campylopus introflexus (Hedw.) Brid.

The habitat of this species is very similar to that of *Ditrichum difficile*. It is relatively common throughout eastern Australia.

Orthotrichaceae

Macromitrium aurescens Hainpe

This species is limited, occurring on the bark of *Casuarina* sp. among the *Melaleuca* thickets. These thickets, which are often quite dense, provide a habitat similar to that on the inland side of the coastal sand-dunes, which they often adjoin, and where *Macromitrium aurescens* is also present on the bark of both *Casuarina* and *Banksia* species (Vitt & Ramsey 1985).

Bryaceae

Bryum billardieri Schwaegr.

This species is occasionally found on sand in areas which are flooded periodically, but dry out. It is relatively common in both the wallum and surrounding areas.

Liverworts

Ricciaceae

Riccia cartilaginosa Steph.

This species is rare, but is found occasionally on bare soil patches which are periodically flooded. These patches develop a heavier texture than is usual in the sandy wallum soils due to the accumulation of fine silts and organic detritus in the lowest altitudes. This species has not been recorded locally from other habitats outside of the wallum.

Lepidoziaceae

Kurzia compacta (Steph.) Grolle

This species is found only, on peat at the base and on paper-like absorbent bark on the lower parts of *Melaleuca quinquinervia* trees. This substratum remains damp for long periods because of the sponge-like effect of drawing up water from between the tree bases. As these sites occupy the lowest elevations in the wallum habitat they remain damp except in periods of extreme drought. Outside of the wallum, this species is relatively plentiful on dead decaying

timber in dense riverine rainforests and also at the margins of closed *Melaleuca* swamps in adjacent areas (Windolf 1985).

Zoopsis argentea (J.D.Hook. & Tayl.) J.D.Hook. & Tayl.

The habitat of this species is very similar to that of *Kurzia compacta*, but it is a much rarer species, both in the wallum and in adjacent areas (Windolf 1985).

Frullaniaceae

Frullania rostrata (J.D.Hook. & Tayl.) J.D.Hook. & Tayl.

This species occurs only very occasionally on the bark of several *Banksia* species, usually in open shrubland or on isolated plants in the open. It is also found in a variety of similar habitats throughout the region, but is never common.

Lejeuneaceae

Lejeunea flava (Sw.) Nees subsp. *orientalis* Schust.

This species is found on the bark of a variety of hosts, and on dead timber in suitable micro-habitats. It is very common in a wide range of habitats in surrounding areas (Windolf 1985), but is not particularly so in the wallum.

Discussion

It is obvious from the small number of species recorded that bryophytes play only a minor role in the overall biology of the wallum. However, in view of the unusual nature of the habitat the recording of the species and notes on their occurrence produce an interesting extension of knowledge in the field of bryophyte ecology, as well as setting a baseline list of species present in this threatened environment.

Although small the bryophyte flora contributes to the overall biodiversity of the region. Of particular significance is the presence of *Sphagnum australe* which was found only in the wallum and not in adjacent areas. Although of limited extent, it appears to be well established and native to this habitat.

Its discovery in the Coolum/Peregian area of south-eastern Queensland is apparently the first record of this species for Queensland and thus of its most northerly occurrence in Australia, normally being associated with the more temperate regions of Australia, New Zealand, South America and South Africa (Scott, Stone & Rosser 1976). With this one exception the taxa present all occur – albeit in varying degrees – in adjacent habitats and their presence in the wallum should be seen as nothing more than a part of their natural distribution.

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